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EXAMINER

HOUSHMAND, HOOMAN

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/757,518	<b>Applicant(s)</b> PASANEN ET AL.	
	<b>Examiner</b> Hooman Houshmand	<b>Art Unit</b> 2419	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 01 May 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1, 12, 15, 18, 21-41 and 51-53 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 12, 15, 18, 21-41, 51-53 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Amendment***

1. The finality of the previous office action has been withdrawn, because of the Pre-Brief Appeal Conference decision.
2. Applicant's amendments and accompanying remarks, filed on 05/01/2008, have been entered and fully considered. Claims 42-50 have been canceled. Claim 32 has been amended. Claims 1, 12, 15, 18, 21-41, 51-53 are now pending.

### ***Drawings***

3. The drawings are objected to because unlabeled rectangular box(es) shown in the drawings (figures 1, 2) should be provided with descriptive text labels. Figure 4 should be provided with descriptive text labels. Figure 5 should be provided with descriptive text labels for the horizontal and vertical axes – in addition, it needs to specify which graph elements 501 and 502 are related to user 1 and user 2. Figure 6 should be provided with distinguishable lines and clarify which method legend is related to which line in the drawing. Presently, the lines in Figure 6 are indistinguishable from one another – additionally, it is unclear which method legend is related to which line in the drawing.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version

of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

4. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the feature (claim 1, lines 3-5, claim 21 lines 3-5, claim 23 lines 4-5, claim 24 lines 4-6, claim 28 lines 4-6, claim 32 lines 4-6, claim 35 lines 4-6, claim 40 lines 3-5, claim 41 lines 5-6) “*the size of a set of sequential subcarriers is greater than the smallest coherence bandwidth of the plurality of users*” must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure

number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Rejections - 35 USC § 101***

5. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. Claim(s) 1, 12, 15, 18 are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. While the claims recite a series of steps or acts to be performed, a statutory “process” under 35 U.S.C. 101 must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different state or thing. The instant claims neither transform underlying subject matter nor positively tie to another statutory

category that accomplishes the claimed method steps, and therefore do not qualify as a statutory process.

***Claim Rejections - 35 USC § 112***

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claims 1, 12, 15, 18, 21-41, 51-53 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

9. The limitation (claim 1, lines 3-5, and similar recitations in claim 21 lines 3-5, claim 23 lines 4-5, claim 24 lines 4-6, claim 28 lines 4-6, claim 32 lines 4-6, claim 35 lines 4-6, claim 40 lines 3-5, claim 41 lines 5-6) *"allocating a plurality of sets of sequential subcarriers in a multicarrier modulation communication system to a plurality of users, wherein the size of a set of sequential subcarriers is greater than the smallest coherence bandwidth of the plurality of users"*, is not adequately described in the specification.

10. Claims 21, 22, 23, 32-39 are rejected under 35 U.S.C. 112, first paragraph, because the claims are a Single Means Claim. The claimed (claims 21, 22, 32-39) *"device"*, and (claim 23) *"communication system configured to"* recitation does not

appear in combination with another recited element of means, and is subject to an undue breadth rejection (a single means claim which covered every conceivable means for achieving the stated purpose was held nonenabling for the scope of the claim because the specification disclosed at most only those means known to the inventor). The claim covers every conceivable structure (means) for achieving the stated property (result) while the specification discloses at most only those known to the inventor (see MPEP 2164.08(a) ).

11. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

12. Claims 1, 12, 15, 18, 21-41, 51-53 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

13. The limitation (claim 1 lines 2-5 and similar recitations in claim 21 lines 3-5, claim 23 lines 4-5, claim 24 lines 4-6, claim 28 lines 4-6, claim 32 lines 4-6, claim 35 lines 4-6, claim 40 lines 3-5, claim 41 lines 5-6) “*allocating a plurality of sets of sequential subcarriers in a multicarrier modulation communication system to a plurality of users, wherein the size of a set of sequential subcarriers is greater than the smallest coherence bandwidth of the plurality of users*” is indefinite.

14. It is unclear whether *the size of a set* refers to *the size of a plurality of sets* or *the size of one set in a plurality of sets*. Hence it is unclear if *the size of one set in a plurality of sets is greater than the smallest coherence bandwidth of the plurality of*

*users* – then the limitation will be met, or if *the size of all sets in a plurality of sets* needs to be *greater than the smallest coherence bandwidth of the plurality of users*. For example, if user 1 has set size 1 and coherence bandwidth 1, user 2 has set size 2 and coherence bandwidth 2, user 3 has set size 3 and coherence bandwidth 3; and  $1 > \text{set size } 2 > \text{set size } 3$  and  $\text{coherence bandwidth } 1 > \text{coherence bandwidth } 2 > \text{coherence bandwidth } 3$ . Then if bandwidth associated with set size 1  $>$  coherence bandwidth 3, would the limitation be satisfied or if bandwidth associated with set size 3, also needs to be,  $>$  coherence bandwidth 3.

15. In addition, if *the smallest coherence bandwidth of the plurality of users* is the same as the system bandwidth – it is unclear how this system would work. In this case, *the size of a set of sequential subcarriers* needs to be greater than the system bandwidth – which is not possible.

16. Another scenario is when *the smallest coherence bandwidth of the plurality of users* is over half the system bandwidth. A first user would be *allocated a set of sequential subcarriers* which is greater than half the system bandwidth. The remainder would then be less than *the smallest coherence bandwidth of the plurality of users*. Hence if each *set of sequential subcarriers* needs to be *greater than the smallest coherence bandwidth of the plurality of users* – only one user would be able to utilize the system.

17. Furthermore, if only a small amount of data is expected to be transmitted on a given transport channel and the resulting *size of a set of sequential subcarriers* happens



to be less than *the smallest coherence bandwidth of the plurality of users* – then according to the limitation no transmission would take place.

18. In another interpretation, if the user with *the smallest coherence bandwidth of the plurality of users* ends the communication – and, the *size of a set of sequential subcarriers* of another user which used to be *greater than the former smallest coherence bandwidth of the plurality of users* – is no longer *greater than the current smallest coherence bandwidth of the plurality of users* – to satisfy the claim limitation, would the system suddenly drop this *set of sequential subcarriers* of the user and abruptly end the communication with the user?

19. The physical elements (claims 21, 22, 32-39) “*device*”, and (claim 23) “*communication system configured to*” are indefinite. An apparatus has been claimed; but, no physical structure that would define the apparatus is recited in the claim.

### ***Claim Rejections - 35 USC § 102***

20. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 12, 15, 18, 21-53 (as best understood) are rejected under 35 U.S.C. 102(e) as being anticipated by Walton (PGPUB: 20040081131).

Regarding **Claim 1**.

Walton teaches (Page 1, Para 5) *a method of allocating* (Para 10: allocating different sets of subbands to different users; partitioning, Fig. 5 shows access points and multiple devices, Fig. 8 shows an access point communicating with two user terminals, controllers controlling OFDM symbol size) *a plurality of sets of sequential subcarriers* (Para 5: partitioning of overall system bandwidth into subbands) in a multicarrier (OFDM) modulation communication system to a plurality of users (Page 1, Para 10), *the size (Bandwidth) of a set of sequential subcarriers is greater than the smallest coherence bandwidth of the users*

(Coherence bandwidth is proportional to the inverse of the delay spread [0030] cyclic prefix is used to combat frequency selective fading, which is caused by delay spread in the system. The delay spread for a transmitter is the difference between the earliest and latest arriving signal instances at a receiver for a signal transmitted by that transmitter.

The delay spread of the system is the expected worst-case delay spread for all transmitters and receivers in the system. To effectively combat inter-symbol interference, the length of the cyclic prefix is selected based on the delay spread of the system such that the cyclic prefix contains a significant portion of all multipath energies; [0031] FIG. 2 OFDM symbols of different sizes including the fixed overhead due to the cyclic prefix;

[0032] using an OFDM symbol with the largest size possible: This means that the users can have a sequential subcarrier size, set of subbands, up to a maximum size;

[0054] If a large amount of data is expected to be transmitted on a given transport channel, then a large OFDM symbol may be used for that transport channel. The cyclic prefix would then represent a smaller percentage of the large OFDM symbol)

Regarding **Claim 12**.

Walton teaches (Page 3, Para 38) *the size of a set of sequential subcarriers comprises a power of two* (sizes are powers of two).

Regarding **Claim 15**.

Walton teaches (Page 1, Para 10) *within an allocation period each set* (reserved subband set) *of sequential subcarriers* (subbands) *is of the same size* (OFDM partitions the system bandwidth into a number of subbands Page 1, Para 5. The number of subbands is determined by the size of the IFFT Page 1, Para 6. The system bandwidth is divided into N subbands with the use of an N-point IFFT Page 2, Para 31).

Regarding **Claim 18**.

Walton teaches (Page 3, Para 32) *allocating* (size of the OFDM symbol) *the plurality of sets of sequential subcarriers* (subbands) *by taking into account channel properties* (coherence time) *of at least one user* (multiple users share the OFDM symbol Para 10).

Regarding **Claim 21**.

Walton teaches (Page 1, Para 5) *a device configured to allocate* (Para 10: allocating different sets of subbands to different users) *a plurality of sets of sequential subcarriers* (subbands) *in a multicarrier modulation (OFDM) communication system to a plurality of users* (Para 10: different users) *in an allocation period* (OFDM symbol period Para 29), *the size of a set of sequential subcarriers is greater than the smallest coherence bandwidth of the users*

(Coherence bandwidth is proportional to the inverse of the delay spread [0030] cyclic prefix is used to combat frequency selective fading, which is caused by delay spread in the system. The delay spread for a transmitter is the difference between the earliest and latest arriving signal instances at a receiver for a signal transmitted by that transmitter. The delay spread of the system is the expected worst-case delay spread for all transmitters and receivers in the system. To effectively combat inter-symbol interference, the length of the cyclic prefix is selected based on the delay spread of the system such that the cyclic prefix contains a significant portion of all multipath energies; [0031] FIG. 2 OFDM symbols of different sizes including the fixed overhead due to the cyclic prefix;

Para [0032] using an OFDM symbol with the largest size possible: This means that the users can have a sequential subcarrier size, set of subbands, up to a maximum size; [0054] If a large amount of data is expected to be transmitted on a given transport channel, then a large OFDM symbol may be used for that transport channel. The cyclic prefix would then represent a smaller percentage of the large OFDM symbol)

Regarding **Claim 22**.

Walton teaches (Page 4, Para 48) *a network element, device, for a cellular (mobile, wireless) telecommunications network.*

Regarding **Claim 23**.

Walton teaches (Page 1, Para 10) *a multicarrier modulation communication system (OFDM system Para 135) configured to allocate (allocating different disjoint sets of subbands to different users) a plurality of sets of sequential subcarriers (sets of subbands) to a plurality of users (allocating to different users) in an allocation period (OFDM symbol period Para 07), the size of a set of sequential subcarriers is greater than the smallest coherence bandwidth of the users*

(Coherence bandwidth is proportional to the inverse of the delay spread [0030] cyclic prefix is used to combat frequency selective fading, which is caused by delay spread in the system. The delay spread for a transmitter is the difference between the earliest and latest arriving signal instances at a receiver for a signal transmitted by that transmitter.

The delay spread of the system is the expected worst-case delay spread for all transmitters and receivers in the system. To effectively combat inter-symbol interference, the length of the cyclic prefix is selected based on the delay spread of the system such that the cyclic prefix contains a significant portion of all multipath energies; [0031] FIG. 2 OFDM symbols of different sizes including the fixed overhead due to the cyclic prefix;

Para [0032] using an OFDM symbol with the largest size possible: This means that the users can have a sequential subcarrier size, set of subbands, up to a maximum size; [0054] If a large amount of data is expected to be transmitted on a given transport channel, then a large OFDM symbol may be used for that transport channel. The cyclic prefix would then represent a smaller percentage of the large OFDM symbol)

Regarding **Claim 24**.

Walton teaches (Page 1, Para 10) *transmitting at least one signal* (transmitting at least a packet Para 11) *relating to at least one set of sequential subcarriers* (subbands) *in a multicarrier modulation communication system* (OFDM system Para 135) *among a plurality of sets of sequential subcarriers* (sets of subbands) *allocated* (allocating different sets of subbands to different users) *in an allocation period* (OFDM symbol period Para 07) *to a plurality of users* (allocating to different users), *the size of a set of sequential subcarriers is greater than the smallest coherence bandwidth of the users* (Coherence bandwidth is proportional to the inverse of the delay spread [0030] cyclic prefix is used to combat frequency selective fading, which is caused by delay spread in the system. The delay spread for a transmitter is the difference between the earliest and latest arriving signal instances at a receiver for a signal transmitted by that transmitter. The delay spread of the system is the expected worst-case delay spread for all transmitters and receivers in the system. To effectively combat inter-symbol interference, the length of the cyclic prefix is selected based on the delay spread of the system such that the cyclic prefix contains a significant portion of all multipath energies;

[0031] FIG. 2 OFDM symbols of different sizes including the fixed overhead due to the cyclic prefix;

Para [0032] using an OFDM symbol with the largest size possible: This means that the users can have a sequential subcarrier size, set of subbands, up to a maximum size;

[0054] If a large amount of data is expected to be transmitted on a given transport channel, then a large OFDM symbol may be used for that transport channel. The cyclic prefix would then represent a smaller percentage of the large OFDM symbol)

Regarding **Claim 25**.

Walton teaches *allocating the plurality of sets of sequential subcarriers* (Page 1, Para 10: allocating sets of subbands to different users) *for transmitting information to the plurality of users*.

Regarding **Claim 26**.

Walton teaches *transmitting a plurality of signals* (Page 8, Para 84: transmitted downlink signals) *to the plurality of users* (Page 8, Para 84: each user terminal).

Regarding **Claim 27**.

Walton teaches (Page 1, Para 10) *allocating the plurality of sets of sequential subcarriers* (allocating different disjoint sets of subbands to different users Page 1, Para 10) *for transmitting information from* (techniques for uplink using OFDM symbols Para 134) *the plurality of users* (allocating to different users).

Regarding **Claim 28**.

Walton teaches (Page 1, Para 10) *receiving at least one signal* (reference received on a subband Para 122 Page 10) *relating to at least one set of sequential subcarriers* (subbands) *among a plurality of sets of sequential subcarriers* (sets of subbands) *allocated to a plurality of users* (allocating different sets of subbands to different users) *in an allocation period* (OFDM symbol period Para 07), *the size of a set of sequential subcarriers is greater than the smallest coherence bandwidth of the users* (Coherence bandwidth is proportional to the inverse of the delay spread [0030] cyclic prefix is used to combat frequency selective fading, which is caused by delay spread in the system. The delay spread for a transmitter is the difference between the earliest and latest arriving signal instances at a receiver for a signal transmitted by that transmitter. The delay spread of the system is the expected worst-case delay spread for all transmitters and receivers in the system. To effectively combat inter-symbol interference, the length of the cyclic prefix is selected based on the delay spread of the system such that the cyclic prefix contains a significant portion of all multipath energies; [0031] FIG. 2 OFDM symbols of different sizes including the fixed overhead due to the cyclic prefix; [0032] using an OFDM symbol with the largest size possible: This means that the users can have a sequential subcarrier size, set of subbands, up to a maximum size;



[0054] If a large amount of data is expected to be transmitted on a given transport channel, then a large OFDM symbol may be used for that transport channel. The cyclic prefix would then represent a smaller percentage of the large OFDM symbol)

Regarding **Claim 29**.

Walton teaches (Page 1, Para 10) *allocating the plurality of sets of sequential subcarriers* (allocating different sets of subbands to different users) *for receiving* (uplinked signals are received by antennas Para 88 Page 8) *information from the plurality of users* (allocating to different users).

Regarding **Claim 30**.

Walton teaches (Page 8, Para 88) *receiving a plurality of signals* (uplinked signals are received Para 88 Page 8) *from the plurality of users* (uplink from a user terminal Para 70, uplinks from user terminals Para 51).

Regarding **Claim 31**.

Walton teaches (Page 1, Para 10) *allocating the plurality of sets of sequential subcarriers* (allocating different sets of subbands to different users) *for receiving information* (communication link to the user terminal Para 48, Page 4) *in the plurality of users* (allocating to different users).

Regarding **Claim 32**.

Walton teaches (Page 1, Para 10) *a device* (mobile station, wireless device Para 48) *configured to transmit at least one signal* (transmitting at least a packet Para 11) *relating to at least one set of sequential subcarriers among a plurality of sets of sequential subcarriers* (subbands) *allocated to the plurality of users* (allocating different sets of subbands to different users) *in an allocation period* (OFDM symbol period Para 07), *the size of a set of sequential subcarriers is greater than the smallest coherence bandwidth of the users*

(Coherence bandwidth is proportional to the inverse of the delay spread [0030] cyclic prefix is used to combat frequency selective fading, which is caused by delay spread in the system. The delay spread for a transmitter is the difference between the earliest and latest arriving signal instances at a receiver for a signal transmitted by that transmitter.

The delay spread of the system is the expected worst-case delay spread for all transmitters and receivers in the system. To effectively combat inter-symbol interference, the length of the cyclic prefix is selected based on the delay spread of the system such that the cyclic prefix contains a significant portion of all multipath energies; [0031] FIG. 2 OFDM symbols of different sizes including the fixed overhead due to the cyclic prefix;

[0032] using an OFDM symbol with the largest size possible: This means that the users can have a sequential subcarrier size, set of subbands, up to a maximum size;

[0054] If a large amount of data is expected to be transmitted on a given transport channel, then a large OFDM symbol may be used for that transport channel. The cyclic prefix would then represent a smaller percentage of the large OFDM symbol).

Regarding **Claim 33**.

Walton teaches (Page 1, Para 10) *plurality of sets of sequential subcarriers is allocated for transmitting information* (techniques for uplink using OFDM symbols Para 134) *to the plurality of users* (allocating different sets of subbands to different users).

Regarding **Claim 34**.

Walton teaches (Page 1, Para 10) *plurality of sets of sequential subcarriers is allocated for transmitting information from the plurality of users* (allocating different sets of subbands to different users), *the device corresponding to at least one of the users* (A user terminal also referred to as an access terminal, a mobile station, a user equipment (UE), a wireless device Para 48).

Regarding **Claim 35**.

Walton teaches (Page 1, Para 10) *a device configured* (OFDM symbol size for each time segment configured Para 40 Page 3) *to receive* (receiver Para 130, Page 11) *at least one signal relating to at least one set of sequential subcarriers* (subbands) *among a plurality of sets of sequential subcarriers allocated to a plurality of users* (allocating different sets of subbands to different users) *in an allocation period* (OFDM symbol period Para 07), *the size of a set of sequential subcarriers is greater than the smallest coherence bandwidth of the users*

(Coherence bandwidth is proportional to the inverse of the delay spread [0030] cyclic prefix is used to combat frequency selective fading, which is caused by delay spread in the system. The delay spread for a transmitter is the difference between the earliest and latest arriving signal instances at a receiver for a signal transmitted by that transmitter.

The delay spread of the system is the expected worst-case delay spread for all transmitters and receivers in the system. To effectively combat inter-symbol interference, the length of the cyclic prefix is selected based on the delay spread of the system such that the cyclic prefix contains a significant portion of all multipath energies; [0031] FIG. 2 OFDM symbols of different sizes including the fixed overhead due to the cyclic prefix;

[0032] using an OFDM symbol with the largest size possible: This means that the users can have a sequential subcarrier size, set of subbands, up to a maximum size;

[0054] If a large amount of data is expected to be transmitted on a given transport channel, then a large OFDM symbol may be used for that transport channel. The cyclic prefix would then represent a smaller percentage of the large OFDM symbol).

Regarding **Claim 36**.

Walton teaches (Page 1, Para 10) *plurality of sets of sequential subcarriers* (subbands) *is allocated for receiving information* (communication link to the user terminal Para 48, Page 4) *from the plurality of users* (allocating different sets of subbands to different users).

Regarding **Claim 37**.

Walton teaches (Page 1, Para 10) *plurality of sets of sequential subcarriers* (subbands) *is allocated for receiving information in the plurality of users* (allocating different sets of subbands to different users), *the device corresponding to at least one of the users* (A user terminal also referred to as an access terminal, a mobile station, a user equipment (UE), a wireless device Para 48 Page 4).

Regarding **Claim 38**.

Walton teaches (Page 1, Para 10) *the device further configured* (OFDM symbol size for each time segment may be configured Para 40 Page 3) *to allocate the plurality of sets of sequential subcarriers* (allocating different sets of subbands).

Regarding **Claim 39**.

Walton teaches (Para 48 Page 4) *the device* (a mobile station, a wireless device) *is for a cellular telecommunications network* (MIMO-OFDM system).

Regarding **Claim 40**. Walton teaches *a transmitter* (Fig 9A [0094]), *allocating* (partitioning) *a plurality of sets of sequential subcarriers* (partitioning of overall system bandwidth into subbands) in a multicarrier (respective carrier) modulation communication system to a plurality of users (Page 1, Para 10), *the size* (Bandwidth) *of a set of sequential subcarriers is greater than the smallest coherence bandwidth of the users*

(Coherence bandwidth is proportional to the inverse of the delay spread [0030] cyclic prefix is used to combat frequency selective fading, which is caused by delay spread in the system. The delay spread for a transmitter is the difference between the earliest and latest arriving signal instances at a receiver for a signal transmitted by that transmitter.

The delay spread of the system is the expected worst-case delay spread for all transmitters and receivers in the system. To effectively combat inter-symbol interference, the length of the cyclic prefix is selected based on the delay spread of the system such that the cyclic prefix contains a significant portion of all multipath energies; [0031] FIG. 2 OFDM symbols of different sizes including the fixed overhead due to the cyclic prefix;

[0032] using an OFDM symbol with the largest size possible: This means that the users can have a sequential subcarrier size, set of subbands, up to a maximum size;

[0054] If a large amount of data is expected to be transmitted on a given transport channel, then a large OFDM symbol may be used for that transport channel. The cyclic prefix would then represent a smaller percentage of the large OFDM symbol).

Regarding **Claim 41**. Walton teaches *a receiver* ([0084] user terminal), *to receive sets of sequential subcarriers* (partitioning of overall system bandwidth into subbands) in a multicarrier (respective carrier) modulation communication system to a plurality of users (Page 1, Para 10), *the size (Bandwidth) of a set of sequential subcarriers is greater than the smallest coherence bandwidth of the users*

(Coherence bandwidth is proportional to the inverse of the delay spread [0030] cyclic prefix is used to combat frequency selective fading, which is caused by delay spread in the system. The delay spread for a transmitter is the difference between the earliest and latest arriving signal instances at a receiver for a signal transmitted by that transmitter.

The delay spread of the system is the expected worst-case delay spread for all transmitters and receivers in the system. To effectively combat inter-symbol interference, the length of the cyclic prefix is selected based on the delay spread of the system such that the cyclic prefix contains a significant portion of all multipath energies; [0031] FIG. 2 OFDM symbols of different sizes including the fixed overhead due to the cyclic prefix;

[0032] using an OFDM symbol with the largest size possible: This means that the users can have a sequential subcarrier size, set of subbands, up to a maximum size;

[0054] If a large amount of data is expected to be transmitted on a given transport channel, then a large OFDM symbol may be used for that transport channel. The cyclic prefix would then represent a smaller percentage of the large OFDM symbol).

Regarding **Claim 51**. Walton teaches *channel properties include the channel response for each set* (channel response matrices page 11 [0131]).

Regarding **Claim 52**. Walton teaches *channel response for a set is measured for one of the plurality of subcarriers of the set* (channel response for each subband page 10 [0104]).

Regarding **Claim 53**. Walton teaches *channel response for a set is measured at the lowest subcarrier of the set* (since the channel response is measured for each subband, this would include the lowest subband page 10 [0104]).

### ***Response to Arguments***

21. Applicant's arguments, filed on 05/01/2008, have been considered but are moot in view of the new ground(s) of rejection.

22. Response to arguments regarding Claim Rejection Under 35 U.S.C. 112, First Paragraph (pages 11-13):

23. The relevant portions of the paragraphs utilized in support of the new limitations are discussed below:

[0029] the numbers of subcarriers in the sets depend on the channel coherence bandwidth of users.

[0052] the sets appear smaller than the channel coherence bandwidth of users.

[0054] discusses channel response calculated within channel coherence time (line 23).

Examiner respectfully points out that *channel coherence bandwidth* and *channel coherence time* are different concepts.

[0060] a formula that relates the *smallest channel coherence bandwidth of users* and the *number of subcarriers* in a set.

[0068] *size of the set of sequential subcarriers* is about twice the *smallest channel coherence bandwidth*.



[0048] the *size of the sets* is typically of the order of the *smallest coherence bandwidth of the users' channels*, or a fraction of this channel coherence bandwidth.

[0050] the *set size* determined using a *user channel coherence bandwidth* may be used. The *set of sequential subcarriers* is larger than the system-specific or cell-specific lower limit.

24. An analysis of the passages and paragraphs pointed to in the arguments shows that there is a possible relationship between *the numbers of subcarriers in the sets* and *the channel coherence bandwidth of users*. However even in the portions of the original disclosure pointed to in support of the new limitation, the opposite of what is being claimed is disclosed. For example, fig. 5 discussed in [0052] shows that *the sets* appear smaller than the *channel coherence bandwidth of users*; [0048] the *size of the sets* is a fraction of this *channel coherence bandwidth*.

25. Additional passages of the original disclosure that the opposite of what is being claimed is disclosed are discussed below:

Paragraph 0073: the *size of a set* is about half of the *smallest coherence bandwidth of the N users*.

Paragraph 0064:  $F=1/2$ . This means that the *size of a set* is about half of the *smallest coherence bandwidth of the N users*.

26. The above analysis shows that *the size of a set of sequential subcarriers* maybe smaller than, or equal to *the smallest coherence bandwidth of the plurality of users*.

27. Examiner respectfully points out that (paragraph 68 on page 18 lines 3-4) *size of the set of sequential subcarriers is determined to be about twice the smallest channel*

*coherence bandwidth ( $F=2$ ) – has a different scope than the new limitation: allocating a plurality of sets of sequential subcarriers in a multicarrier modulation communication system to a plurality of users, wherein the size of a set of sequential subcarriers is greater than the smallest coherence bandwidth of the plurality of users.*

28. Additionally analyzing the equation on page 16:

[0060] In the simulation, for methods in accordance with embodiments of the invention the number of subcarriers in a set is determined for each channel realization by

$$d = 2^{\lfloor \log_2(FN_{\text{carriers}}W_{\text{coh}}/W) \rfloor}$$

where  $W_{\text{coh}}$  is the smallest coherence bandwidth of users for a sample,  $W$  is the multicarrier modulation bandwidth,  $N_{\text{carriers}}$  is the total number of subcarriers and  $F$  indicates the fraction of coherence bandwidth.  $\lfloor \cdot \rfloor$  denotes the integer part. The restriction of the size of the sets to powers of two is done to simplify the allocation routines. It also serves to reduce the amount of signaling; see below further discussion on signaling needs. In the simulations,  $W = 100$  MHz and  $N_{\text{carriers}} = 2048$ . The number of subcarriers in a set  $d$  varies from a sample to sample and from allocation method to method.

IF  $W_{\text{coh}}$  is on the order of  $W$ , and  $F=2$ ; then the number of subcarriers ( $d$ ) would be higher than Number of carriers ( $N_{\text{carriers}}$ ) – which is not possible.

29. Furthermore (page 18) states:

[0068] As can be seen in Figure 6, the difference in spectral efficiency is at most 0.1 bps/Hz for methods 2 and 3 with respect to the reference method 4. Even when the size of the set of sequential subcarriers is determined to be about twice the smallest channel coherence bandwidth (that is,  $F = 2$ ), the difference in the spectral efficiency is only about 0.2 bps/Hz. Figure 6 shows no simulation results for this case. It is furthermore noted that the losses would be even smaller if the gain due to simplified signaling would be taken into account.

Hence even if an embodiment is utilized where (lines 3-4) *size of the set of sequential subcarriers is determined to be about twice the smallest channel coherence bandwidth ( $F=2$ )* – the difference in the spectral efficiency would be minimal (line 5: only about 0.2 bps/Hz).

### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hooman Houshmand whose telephone number is (571)270-1817. The examiner can normally be reached on Monday - Friday 8am - 5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Kizou can be reached on (571)272-3088. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/H. H./  
Examiner, Art Unit 2419

/Hassan Kizou/  
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